

INSTALLATION MANUAL

Xsite EASY System



Please completely read this operation manual and the contained safety installations and note all given information before usage.

Keep available for further consideration!!!

ENGLISH

Original installation manual

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Please handle this installation manual confidentially. It is intended only for use by persons involved with the product.

The text and graphics of this manual have been elaborated with the greatest possible care. However, we may not be held liable for possible errors and failure effects.

Should you wish to make suggestions regarding the arrangement of this manual or point out possible errors, please contact your local dealer. We will gladly take up any of your ingenious ideas and suggestions.

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2. Introduction

This document is the installation manual of the Vision 3D machine control system. Please completely read this manual and the contained safety installations and note all given information before usage. Keep the manual available for further consideration.

Conformity to directives and regulations

This product is in conformity with EU's EMC (2004/108/EC), RoHS (2002/95/EC), and WEEE (2002/96/EC) directives and REACH (2006/1907/EC) regulation. This product may not be disposed of together with unsorted household waste, it must be collected separately.



Disclaimer

- The manufacturer excludes any liability for damages caused by:
- Inappropriate assembling and installation
- Non-observance of the installation manual
- Non-intended and improper use
- Use beyond operation limits
- Deployment of insufficiently qualified and trained personnel
- Use of unauthorized spare parts and accessories
- Rebuilding of the product

Installation manual

This installation manual contains basic information to be considered when using and maintaining the product. Observing all security installations and guidelines given here is indispensable for secure operation. Therefore this installation manual has to be read and applied without fail by any person assigned with working processes at the machine, such as operation, disturbance elimination and maintenance.

This manual is a part of the product and as the case may be has to be passed to third persons or following owners. It has to be permanently kept at the usage site and be available for the operating personnel. Furthermore the local accident prevention regulations for the product's operational area, the general safety regulations as well as the manufacturer's safety regulations have to be observed.

The product is available with diverse sensor combinations. In case your system is not equipped with all sensors or other components, their description is a matter of unimportance. Due to multiple possible applications, the functions of the product in this manual will be explained at the example of an excavator.

We are eager to ensure the correctness and up-to-dateness of this installation manual. To preserve our technological advance, it can be necessary to undertake modifications of the product and its operation without prior notice which under circumstances may not correspond to this manual. In that case your local dealer will provide you with a new manual. We exclude liability for disturbances, failures and resulting damages.

The text and graphics of this manual have been elaborated with the greatest possible care. However, we may not be held liable for possible errors and failure effects. Should you wish to make suggestions regarding the arrangement of this manual or point out possible errors, please contact your local dealer. We will gladly take up any of your ingenious ideas and suggestions.

Explanation of symbols

In this installation manual warning notices are marked by symbols. Under all circumstances observe these notices and proceed carefully to prevent accidents, personal injuries, and material damages.



Indicates a hazardous situation. If not avoided, could result in death, serious injury, or material damages.

NOTE! Emphasizes useful tips and recommendations as well as information referring efficient and failure-free operation.

2.1. Safety instructions

This section outlines all important safety matters referring the personnel's optimal safety as well as failure-free operation. These installations shall enable users to recognize potential risks of use and as possible prevent them in advance. Every user has to understand and observe these installations.

Conventional use

Vision 3D has been exclusively designed and constructed for conventional use as described here. Positioning the measuring point of the tool (e.g. bucket, blade) of a construction machine with the help of gravitation sensors, laser receiver, GNSS receiver(s) or other positioning devices. Indication of the position of the measuring point to the user or to a third party system. Comparison of the position of the measuring point with various types of reference information.

Any other use not listed here as well as any application not complying with the technical data is not conventional and inappropriate.

Inappropriate use

- Non-conventional use
- Exceeding of the limit values given on the data sheet
- Use of the product without installations
- Use of the product beyond the limits of use
- Invalidation of safety equipment
- Removal of indicating or warning labels
- Opening of the product
- Rebuilding or alteration of the product
- Commissioning of the product after misappropriation
- Use of the product in spite of obvious defects or damages
- Use of the product with unauthorized accessory from foreign manufacturers
- Use of the product at insufficiently secured construction sites

Alteration and rebuilding of the product

To prevent risks and ensure optimal performance neither alterations or attachments or rebuildings of the product may be carried out without the manufacturer's explicit permission.

The operator's responsibility

The product is used in the industrial sector. Therefore the operator of the product is liable to the legal responsibilities for operational safety. Besides the operational safety installations in this manual, the safety, accident prevention, and environmental protection regulations valid for the operational area of the product have to be observed.

Particularly applying:

The operator has to inform himself about the current operational safety regulations and, in a risk assessment, detect additional risks that are caused by the special working conditions at the usage site of the product. These then have to be implemented in the form of directives. These directives have to be kept near to the product and permanently be available for the persons working with it.

The operator has to clearly define the personnel's responsibilities referring the appliance.

The operator has to ensure that the installation manual's content is fully understood by the operating personnel.

The statements of the installation manual have to be observed thoroughly and unrestrictedly.

The operator has to ensure that all maintenance, inspection and assembling processes are carried out by qualified specialized personnel, which have informed themselves sufficiently by closely studying the manuals for the product's operation.

The operator informs the manufacturer or the authorized dealer if any safety defects occur at the product or during operation.

Special risks**Risks caused by electric current!**

When working close to electric systems (e.g. overhead powerlines), there is danger to life due to electric shock. Keep sufficient safety distance to electric systems.

**Moving components!**

Keep persons away from the machine's and the tool's working range. Remove objects from the machine's and the tool's working range. Do not interfere with the moving components during operation

**Overlapping machine parts!**

Subsequently assembled system components (e.g. GNSS masts) can overlap the typical machine dimensions. This can lead to injuries and material damages

**Risk of injury caused by malfunction!**

Uncontrolled machine actions caused by the malfunction of a system component can lead to severe personal injuries in the machine's working range or cause material damage. Ensure that the machine is operated, controlled and inspected by a qualified and experienced operator, who has to be able to induce emergency measures, e.g. an emergency stop.

**Lacking instruction!**

Lacking or insufficient instruction can lead to operating errors or incorrect use. This can lead to severe personal injuries as well as severe material and environmental damages. Observe the manufacturer's safety installations and the operator's directives.

**Risk of injury caused by insufficient safeguarding!**

Insufficient safeguarding of the construction site and the component's location, e.g. of the laser emitter, can lead to hazardous situations in traffic and at the construction site. Ensure sufficient safeguarding of the construction site. Ensure sufficient safeguarding of the single components' locations. Observe the country-specific safety and accident prevention regulations as well as the current road traffic regulations.

**Risks caused by faulty measurement results!**

Faulty measurement results due to use of a dropped product, another illegitimate demand or an alteration can lead to severe material damages. Do not use obviously damaged products. Before reusing a dropped component, carry out a check measurement.

**Risk of injury caused by unreadable signs!**

In the course of time, labels and symbols on the product can get dirty or get unrecognizable due to other events. Due to immoderate mechanical effects labels and symbols can be detached. Always keep safety, warning and operation installations in a well readable state. Regularly check the adhesiveness of the labels and symbols on the product. Do not remove labels and symbols from the product.

**Risk of injury caused by inappropriate disposal of the product!**

When burning plastic parts, toxic gases that can cause illnesses emerge. Dispose the product properly according to the current national country-specific disposal regulations. Careless disposal might also enable unauthorized persons to improperly use the product. In doing so these persons and/or third persons can be severely injured and also pollute the environment. At all times, protect the product against the access of unauthorized persons.

Proceeding in case of danger and accidents

- Preventive measures
- Always be prepared for possible accidents or the event of fire.
- Keep first-aid equipment (ambulance box, blankets etc.) within reach.
- Familiarize the personnel with accident notification and first-aid equipment as well as emergency services.
- Keep the access routes clear for emergency vehicles.
- If the event occurs, proceed appropriately
- Immediately put the product out of action by switching the power off.
- Induce first-aid-measures.
- Recover persons out of the hazard zone.
- Inform the responsible person at the usage site.
- Alarm a doctor and/or the fire brigade.
- Keep the access routes clear for emergency vehicles.

2.2. Product overview

Xsite EASY is a machine guidance system for excavators. Xsite EASY indicates the position of the measuring point compared to a reference level.

The system contains the following components by default (Figure 1):

- Display unit
- Connection box for LED display
- Gravitation sensors for bucket, dipper stick, main boom, and frame

The system can be expanded by adding the following optional accessories (Figure 1):

- Tilt bucket sensor
- Dual block boom sensor
- Laser receiver
- LED display

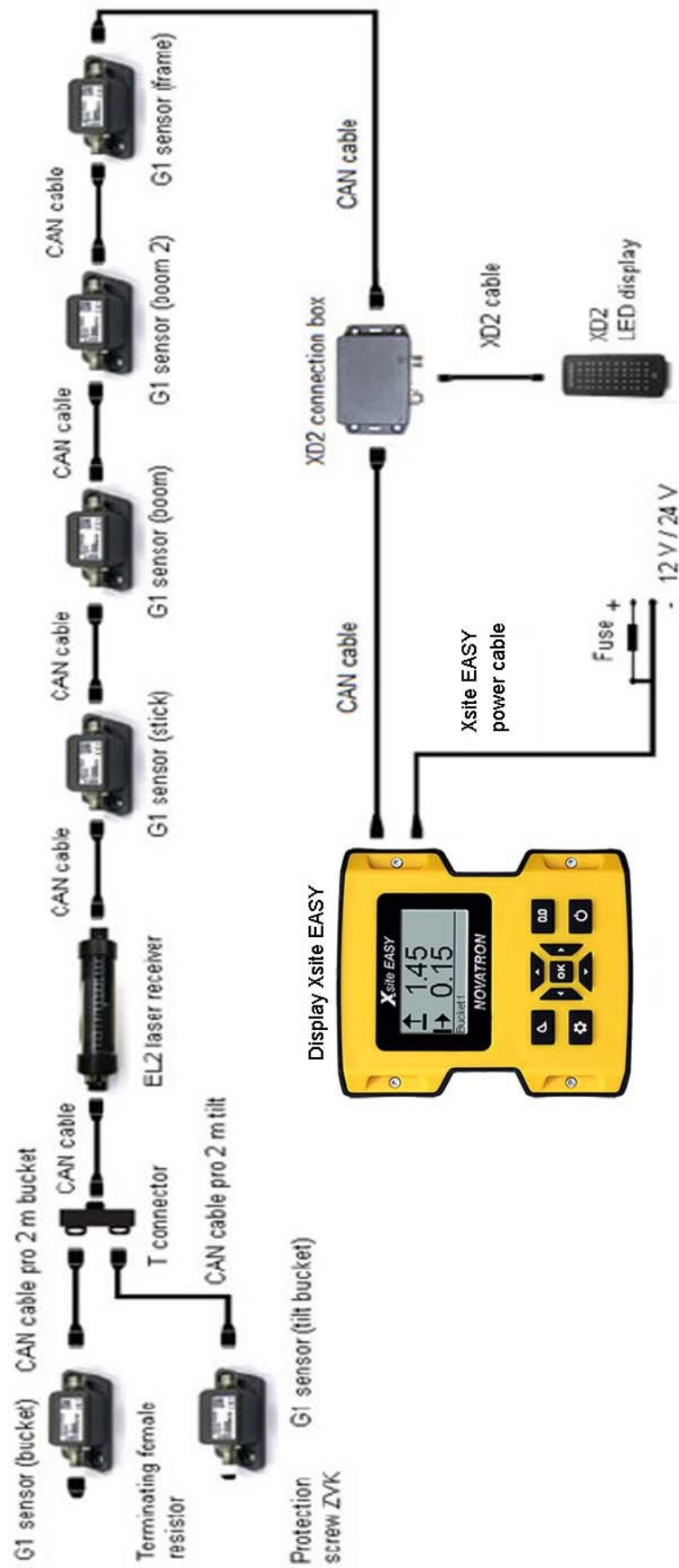


Figure 1. System diagram

2.3. Handling of the system

The display is not completely waterproof. If the display or other components are taken away from the construction machine, a carrying case should be used. Make sure that the components are clean and dry before placing them in the carrying case. Also make sure that the carrying case is clean and dry.

2.4. Transportation and storage

When taking the equipment to the usage site or in the field, always ensure that the product is transported in secured and suitable containers. Never transport the product loosely in the car. The product's function can be severely harmed by hits and thrusts. In case of transportation by railway, plane or ship, always use the original packaging, transport containers and transport boxes. The packaging protects the product against hits and vibrations.

Only store the product in well aired, dry rooms. During storage, protect it against dampness, and preferably use the original packaging. Avoid strong thermal fluctuation during storage. Incipient formation of water condensation can harm the product's function.

2.5. Support and maintenance

Manufacturer or dealer will provide the maintenance services. Installation and service of the product should be carried out only by trained and qualified personnel.



For safety reasons (risk of high voltages), only representatives of the manufacturer are allowed to open the housings.

3. Installation of components

The chapters below provide information about installation of the components

3.1. Components inside the cabin

When mounting the displays, notice the following precautions:

- Display should be mounted so that it is easily reachable by the operator.
- Display should not block the view outside.
- Display should not block the view to machine's integrated display.
- Display should not prevent the front window from opening.
- Display should not restrict moving of operator's seat.
- Display should not restrict access to the steering wheel or joysticks.

Attach the Xsite EASY display and the XD2 LED display to the front or side window by suction cups (Figure 2). Before attaching the suction cup, make sure that the window is clean (use for example isopropyl alcohol if needed) and warm (warm it up carefully if needed).

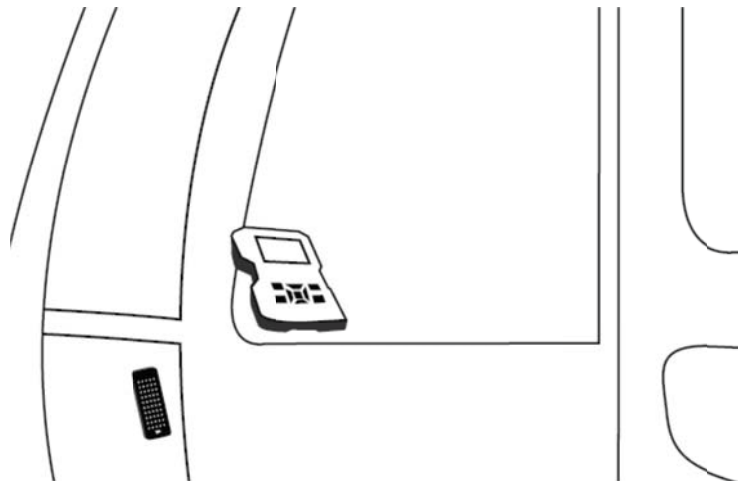


Figure 2. Example of the mounting place of the Xsite EASY display and the XD2 LED display

Mount the XD2 connection box for example behind the operator's seat by screws or tape (Velcro, Dual lock). Make sure that all cables can reach to the connection box and that the connection box does not restrict moving of operator's seat. Make sure that the plastic covers of the cabin can be detached without unmounting the connection box.

3.2. Inclination sensors and laser receiver

Inclination sensors are mounted on the moving parts of the excavator. Sensors are labelled with the following identification numbers (Figure 3):

- 101. Bucket sensor
- 102. Stick sensor
- 103. Main boom sensor
- 104. *Not used*
- 105. Frame sensor
- 106. Extra boom sensor (if excavator is equipped with dualblock boom)
- 107. Tilt bucket sensor (optional)

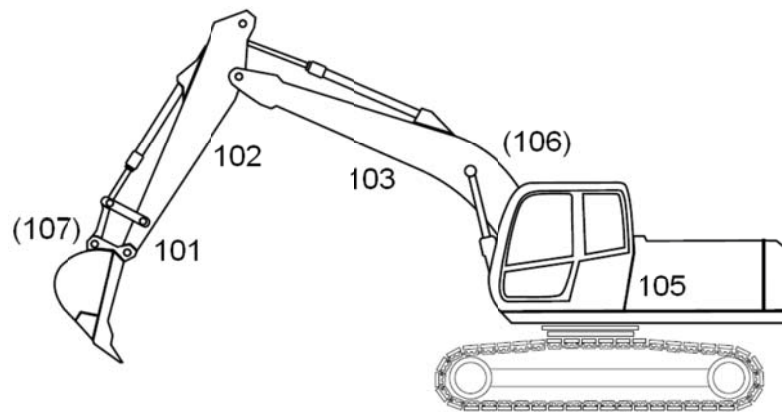


Figure 3. Sensor IDs

It is possible to change the sensor ID with a PC software provided by Novatron. For example if replacing a broken sensor with a new one, the ID of the new sensor must be the same as the ID of the broken sensor.

It is not needed to align the sensors with the boom lines (the line between two pivot points). Software calibration corrects the deviation from the boom line. However, some sensors require more precise mounting than others.

Sensors are mounted in the following order:

1. Tilt bucket sensor (optional)
2. Bucket sensor
3. Stick sensor
4. Main boom sensor
5. Extra boom sensor (optional)
6. Frame sensor

The sensors should be mounted where the cable from the previous sensor ends in order to avoid loose cable on the boom. If the bucket is very greasy, install the tilt bucket sensor last to avoid staining of the cabin during the rest of the installation procedure.

In most cases sensors are mounted by using bolts. However, some machine manufacturers do not accept drilling of the boom. In those cases, sensors are attached to mounting plates by screws. Mounting plates are welded on the boom.

There are three measurement axes in the sensor (Figure 4).

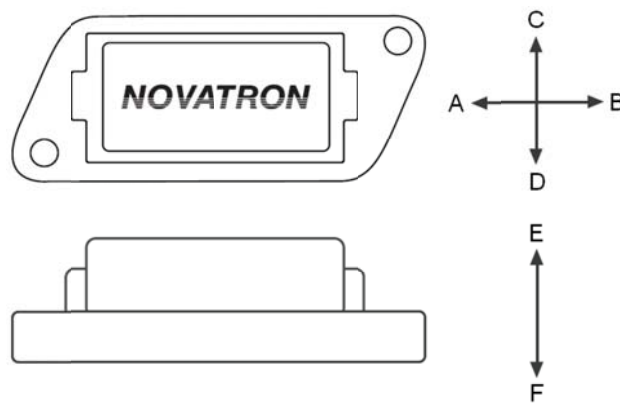


Figure 4. Measurement axes

Sensors can be mounted to several different positions (Figure 5). Not all mounting orientations are possible for all sensors. See chapters 3.2.1 – 3.2.5 for details

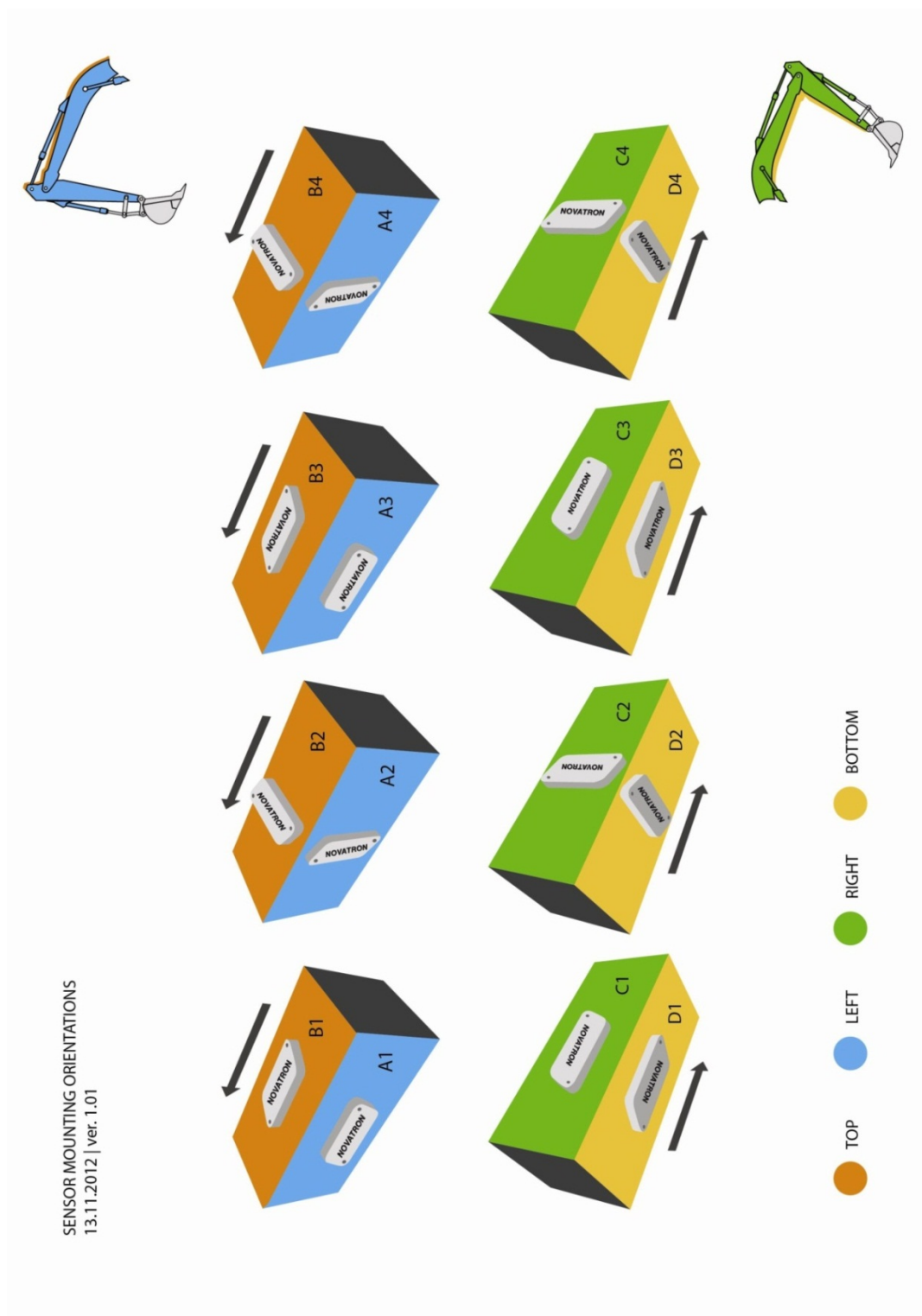


Figure 5. Mounting orientations (arrow points forward)

3.2.1. Tilt bucket sensor



Movements of the bucket and bucket accessories have to be checked before installing the sensor or sensor cables. Movements of the cable have to be checked after the installation.



The moving part of the cable has to be covered by a shield. Shielded cable from the bucket sensor has to be connected with one or more fasteners. Mount the first fastener approximately 15 cm from the sensor.

Tilt bucket sensor can be mounted on a tilt rotator, tilting quick coupler or tilting bucket.

Possible mounting orientations for the tilt bucket sensor are:

- A1: left side, measurement axis A pointing forward
- B1: on the top, measurement axis A pointing forward
- B2: on the top, measurement axis A pointing right when looking from the cabin
- B3: on the top, measurement axis A pointing backward
- B4: on the top, measurement axis A pointing left when looking from the cabin (Figures 8 and 9)
- C1: right side, measurement axis A pointing forward
- D1: at the bottom, measurement axis A pointing forward
- D2: at the bottom, measurement axis A pointing left when looking from the cabin (Figure 7)
- D4: at the bottom, measurement axis A pointing right when looking from the cabin



If possible, mount the sensor in a safe place. A shield (for example out of steel) can be made for the sensor, if needed.

NOTE!

For an easy access to the sensor connector, it should be close to the hydraulic hose connectors of the tilt rotator.

NOTE!

Always align the tilt bucket sensor either with the boomline or in a way that is forms a 90° angle with the boom (Figure 6). Deviation of +/- 1° can be tolerated. However, the smaller the deviation, the better the measurement result.

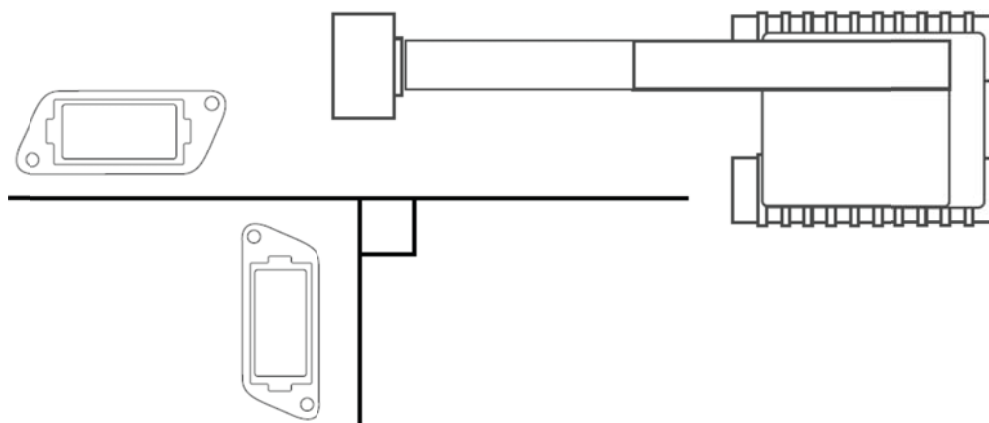


Figure 6. Alignment of the tilt bucket sensor

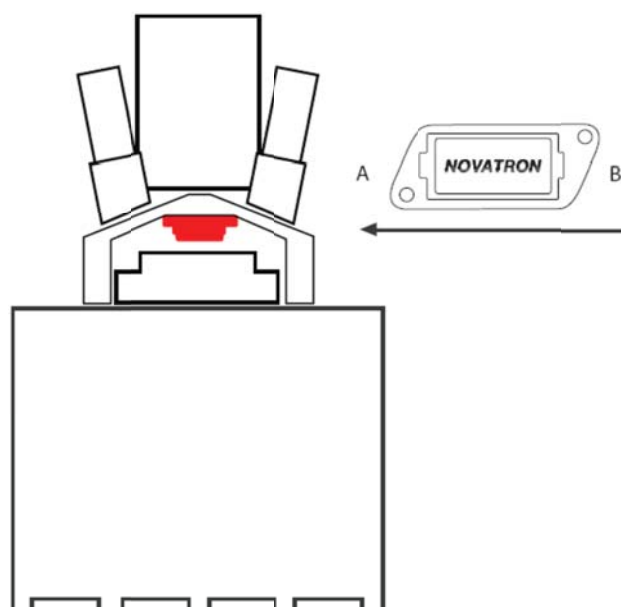


Figure 7. Tilt bucket sensor on the tilting part of the tilt rotator, inside the cover plate (mounting orientation D2). Mounting place depends on the manufacturer of the tilt rotator. In this example the sensor is mounted upside down.

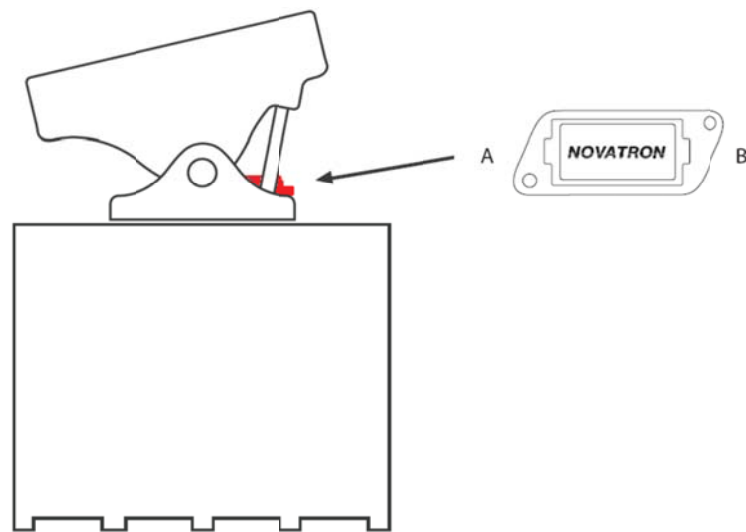


Figure 8. Tilt bucket sensor on a tilting quick coupler (mounting orientation B4)

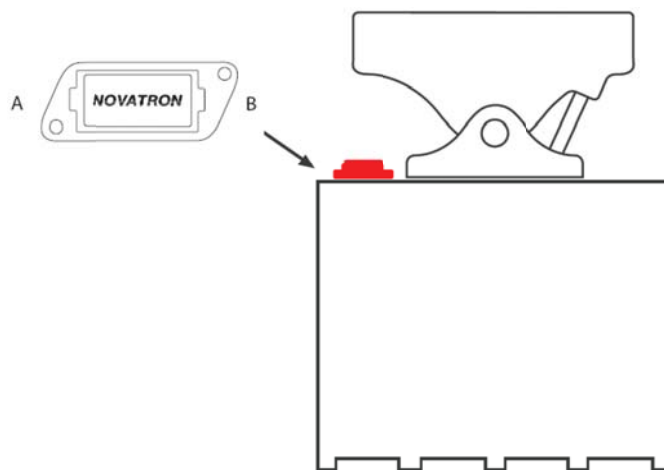


Figure 9. Tilt bucket sensor on a tilting bucket (mounting orientation B4)

3.2.2. Bucket sensor



Movements of the bucket and bucket accessories have to be checked before installing the sensor or sensor cables. Movements of the cable have to be checked after the installation.



The moving part of the cable has to be covered by a shield. Shielded cable from the bucket sensor has to be connected with one or more fasteners. Mount the first fastener approximately 15 cm from the sensor.

Bucket sensor can be installed on quick coupler or linkage.

Possible mounting orientations for quick coupler installation are:

- A1: left side, measurement axis A pointing to the bucket tip (Figure 10)
- B1: on the top, measurement axis A pointing to the bucket tip
- B4: on the top, measurement axis A pointing left when looking from the cabin
- C1: right side, measurement axis A pointing to the bucket tip

When installing the sensor on the quick coupler, it is not necessary to align the sensor exactly with the line from the bucket pin to the bucket tip (Figure 10). Bucket calibration corrects the deviation from the line. However, the deviation should be as small as possible. Note that when changing the bucket, the deviation also changes.

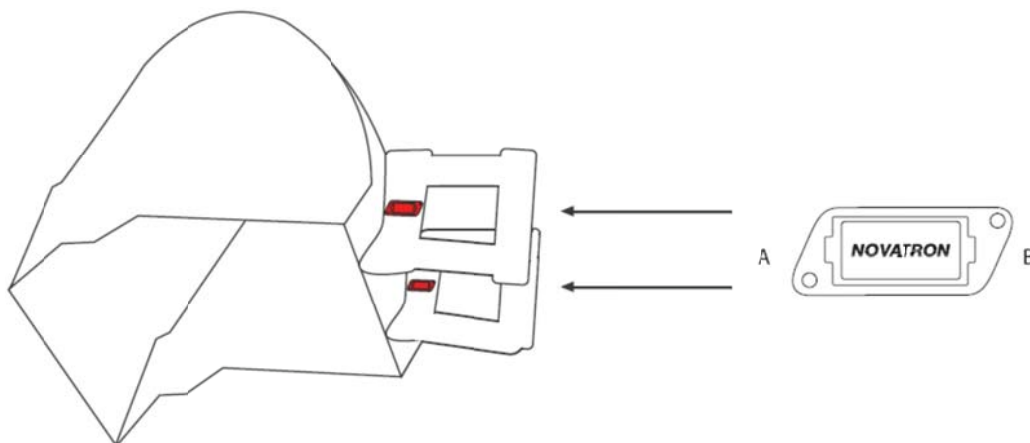


Figure 10. Installation on the inner or outer surface of the quick coupler (mounting orientation A1)

Possible mounting orientations for linkage installation are:

- A1: left side, measurement axis A pointing forward (Figure 11)
- B1: on the top, measurement axis A pointing forward
- C1: right side, measurement axis A pointing forward

When installing the sensor on the linkage, align the sensor with the line between the linkage pins within an accuracy of $\pm 10^\circ$.

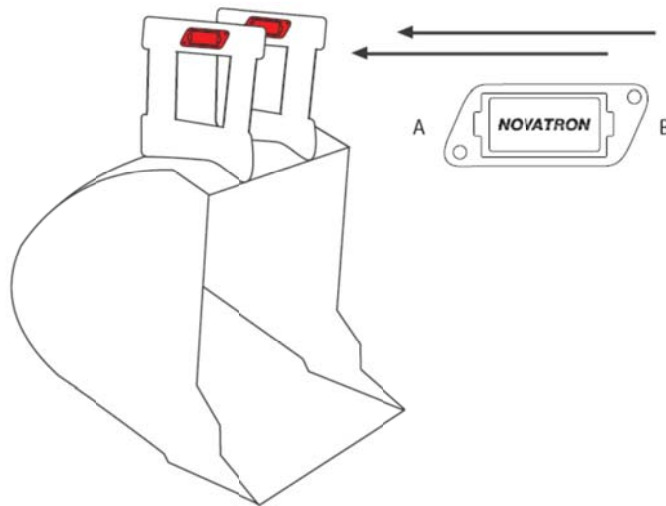


Figure 11. Installation on the inner or outer surface of the linkage (mounting orientation A1)

3.2.3. Laser receiver

Laser receiver is mounted connectors pointing downwards on the left side of the stick aligned exactly with the line between the stick pin and the bucket pin (Figure 12). Laser receiver should be mounted in a sheltered place if possible. Laser receiver should be mounted on the lower part of the stick, so that it is not needed to lift the transmitter unnecessarily high.

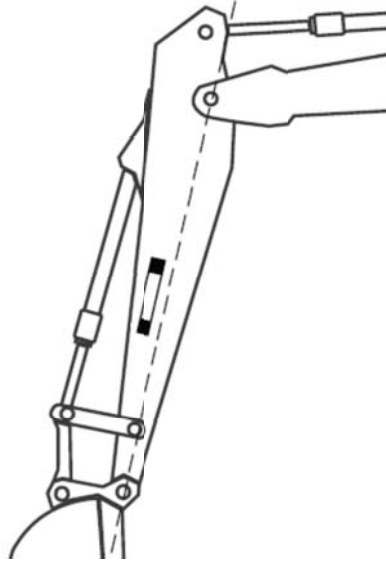


Figure 12. Laser receiver

3.2.4. Stick, main boom, and extra boom sensors

Possible mounting orientations for the stick, main boom, and extra boom sensors are

- A1: left side, measurement axis A pointing to the bucket (Figure 13)
- C1: right side, measurement axis A pointing to the bucket
- C3: right side, measurement axis A pointing to the cabin

If the boom consists of two parts, extra boom is the part that is closer to the cabin.

Align the sensor with the boom line within an accuracy of $\pm 10^\circ$. The sensor should be mounted in a sheltered place if possible. To avoid harmful accelerations, the sensor should be mounted as close to stick/boom pin as possible.

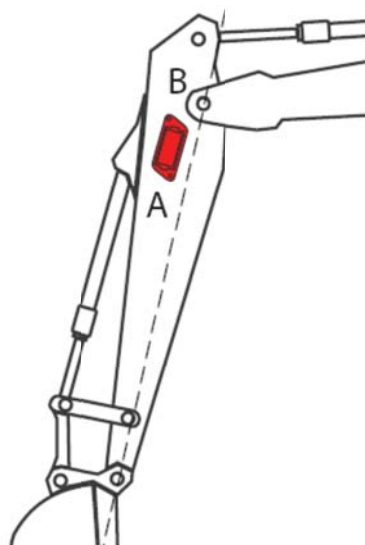


Figure 13. Stick sensor (mounting orientation A1)

NOTE!

It is not allowed to mount the main boom or extra boom sensor on the narrowing part of the boom (Figure 14).

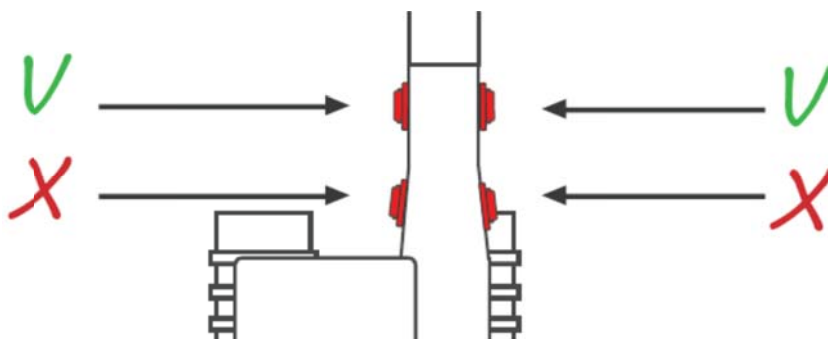


Figure 14. Main boom and extra boom sensor



Check the movements of the cable after installation.

3.2.5. Frame sensor

Possible mounting orientations for the frame sensor are

- A1: left side, measurement axis A pointing to the bucket
- B1: on the top, measurement axis A pointing to the bucket (Figure 15)
- C1: right side, measurement axis A pointing to the bucket

Frame sensor should be aligned exactly with the boom centre line. Maximum acceptable deviation from the line is $\pm 1^\circ$. However, the smaller the deviation, the better the measurement result.

Best mounting position is on the top of the machine and very near to the rotation centre of the machine. When mounting on the top of the machine, ensure that cover plates are not vibrating with engine revolutions. Optional mounting positions are engine area floor or cabin floor as long as the cabin is tilting along the frame of the machine.

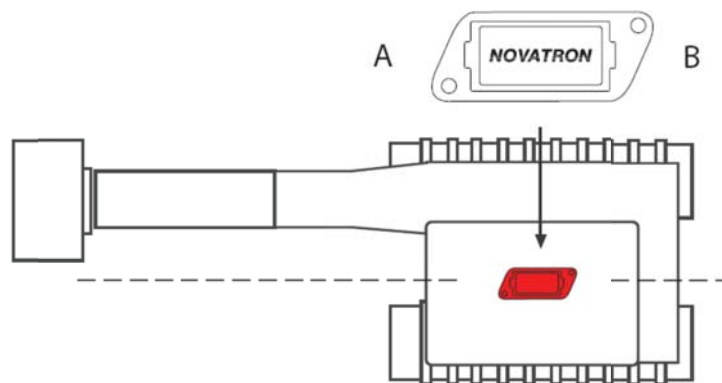


Figure 15. Frame sensor, mounting orientation B1

3.3. Finalising the installation

Take the cables from devices that are mounted outside the cabin into the cabin through one inlet.

The cables can be taken into the cabin for example by using one of the following options:

- Holes underneath the bottom cover
- Lamp cable holes
- Pedal holes



Do not drill any holes to the cabin! The cabin is considered as safety equipment.

3.3.1. Powercord

The Xsite EASY system requires 24 VDC input voltage. Power supply should be able to provide 1 A at 24 V.

NOTE! Install 12 V to 24 V converter to machines with 12 V battery.

Remove the fuse from the fuse holder before installing the power cord. The fuse will be put back after all components and cables have been installed.

Connect plus (red) to the main power switch of the machine (Figure 16). Alternatively connect plus (red) straight to the battery output (Figure 17). Connect ground (yellow) to the machine chassis.

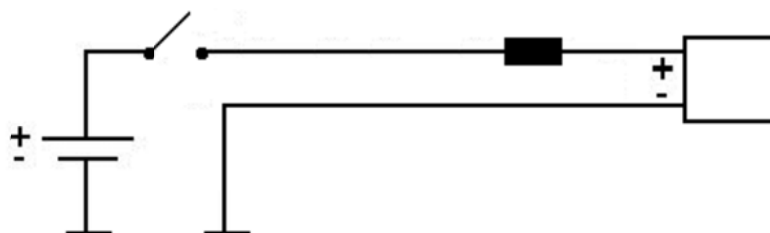


Figure 16. Wiring diagram, plus to machine's main power switch, ground to machine chassis

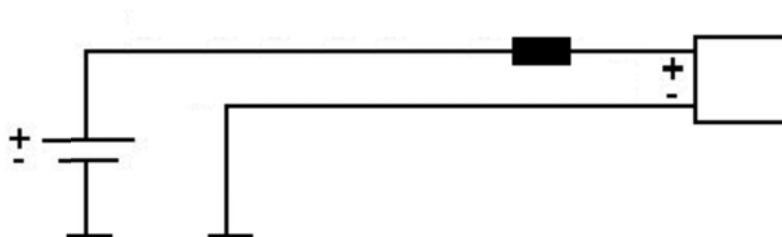


Figure 17. Wiring diagram, plus to machine's battery, ground to machine chassis

After the power cord has been connected to a power supply, connect the other end to the display.



The Xsite EASY power cable must be always equipped with a fuse.

4. Installation data

Lengths must be measured precisely with 1 mm accuracy unless otherwise stated. Measure the lengths and write them down.

Machine coordinates (X, Y, Z) are explained in Figure 18.

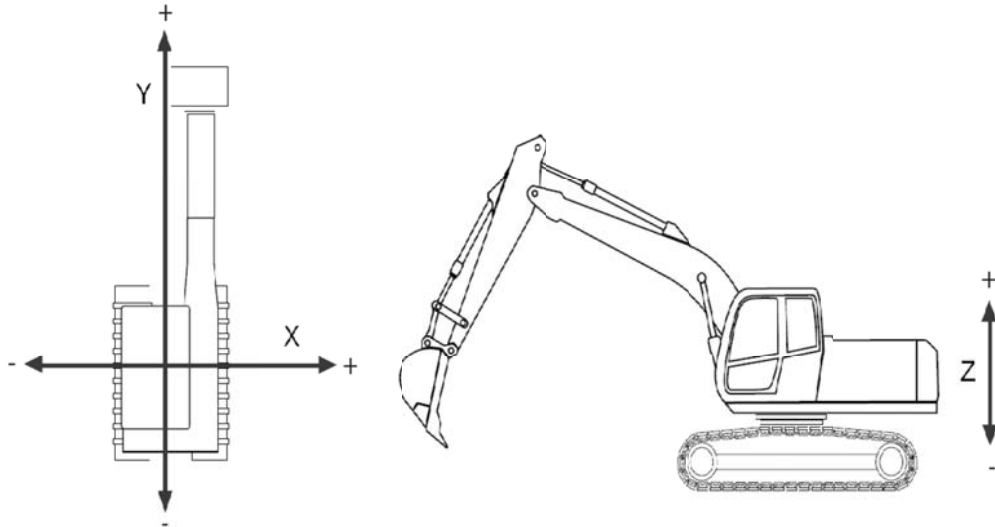


Figure 18. X, Y and Z coordinates of the machine

4.1. Bucket lengths

Measure bucket length from the centre point of the lowest stick pin to the bucket tip (Figure 19). Measure left bucket width and right bucket width. If the tilting bucket is used, also measure the quick coupler value.

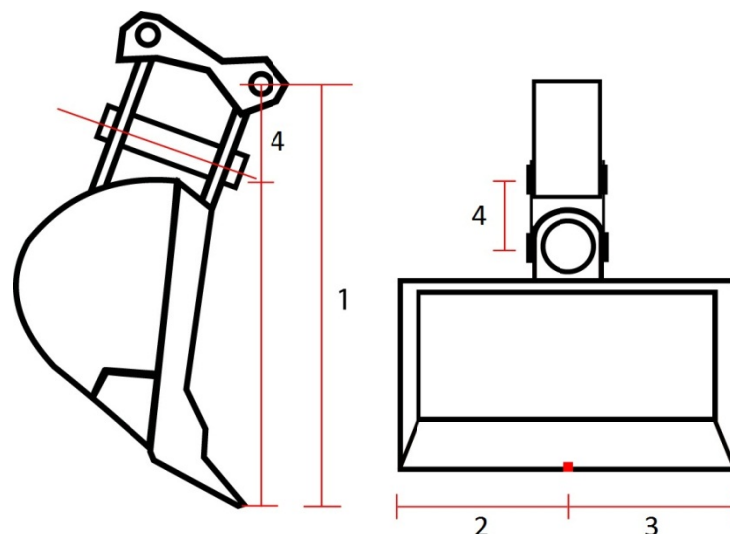


Figure 19. Bucket measures: 1) Bucket length, 2) Left width, 3) Right width, 4) Quick coupler

4.2. Linkage lengths

Linkage lengths are measured if the bucket sensor has been mounted on the linkage (Figure 20). Linkage parameters are measured from the centre points of the pins.

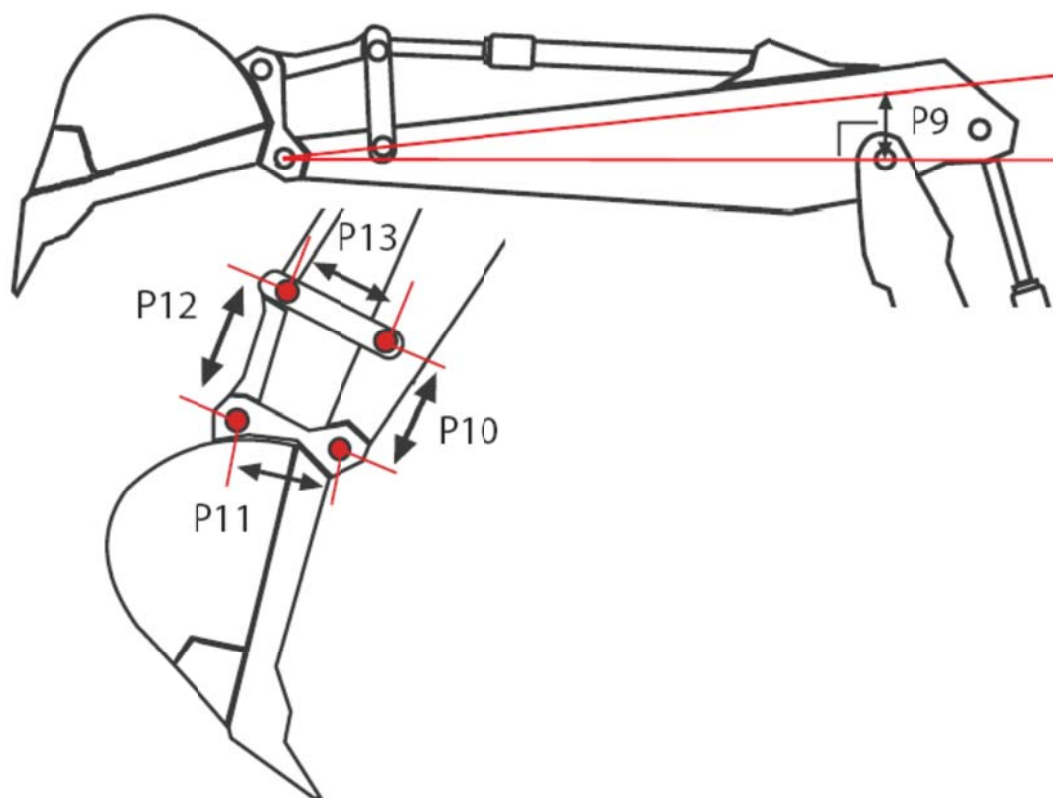


Figure 20. Linkage lengths

4.3. Laser receiver lengths

Measure X offset, Y offset and Z offset.

X offset is measured from the centre line of the laser receiver to the centre line of the stick. X offset can be calculated by measuring the thickness of the stick, dividing the measure by two and adding 70 mm to the value. Value is negative, because laser receiver is mounted on the left side of the stick (Figure 21).

Y offset is measured from the stick/boom pin to the upmost photodiode of the laser receiver. Value is positive, if the photodiode is on the left side of the pin (Figure 21).

If the laser receiver has not been mounted on the line between the bucket pin and the stick pin, Z offset has to be measured from the pin line to the centre line of the laser receiver. Value is positive, if the laser receiver is above the boom line (Figure 21).

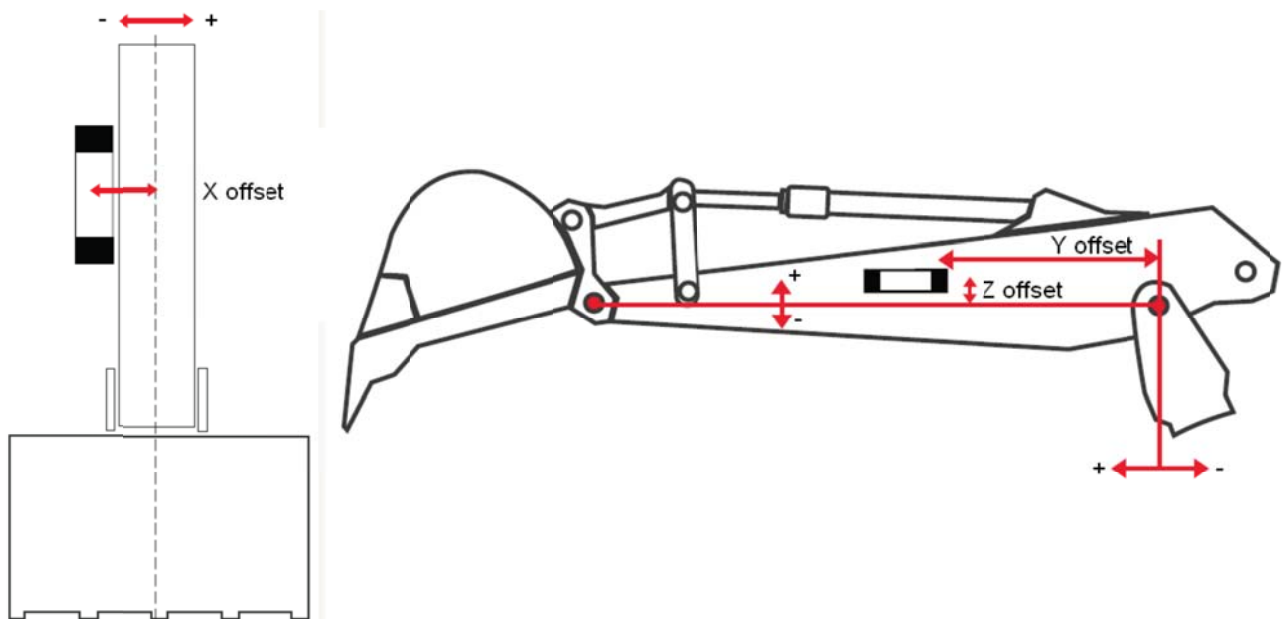


Figure 21. Laser receiver lengths, laser receiver is mounted on the left side of the stick

4.4. Boom lengths

Measure stick and main boom lengths (Figure 22). Measure extra boom length, if the boom consists of 2 parts. Extra boom is the part that is closer to the cabin. Lengths are measured from the centre points of the pins.

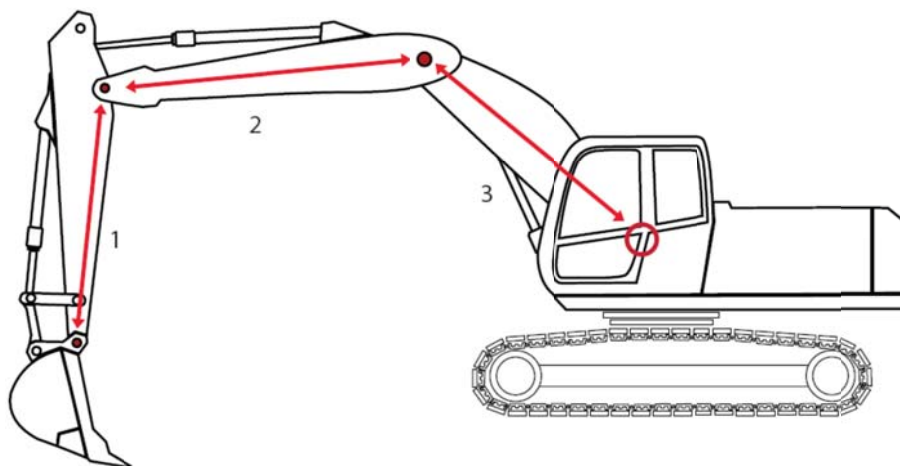


Figure 22. Boom lengths: 1) Stick, 2) Main boom, 3) Extra boom

4.5. Rotation centre point offsets

Measure X offset and Y offset (Figure 23). Lengths are measured from the boom pin to the rotating centre point of the machine.

NOTE! Before measuring, make sure that you have identified the rotating centre point of the machine. The rotating motor can be easily misinterpreted as the rotating centre point.

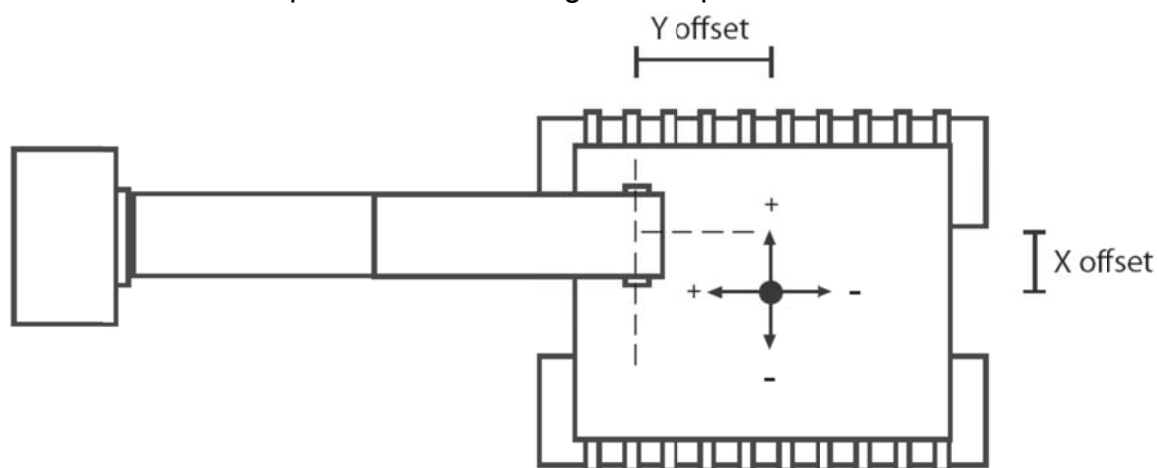


Figure 23. Rotation centre point offsets

5. Calibration

NOTE! Sensors are equipped with internal heating. When excavator is used at cold circumstances, it takes time for the sensors to warm up and provide good accuracy. The amount of time needed after turning ON the system and before starting work process (to ensure accurate measurement results) is shown in the following table.

Temperature	Heating time
-20°C	~20 min
-10°C	~10 min
-5°C	~5 min

To access the calibration settings, press the “Main menu” button for 3 seconds. Then press the “Down arrow” and “0.0” buttons simultaneously for 3 seconds. New items (“Frame”, “Boom”, “Bucket sensor” and “Equipment”) will appear below the “Info” item.

Up to 3 machines can be calibrated in one Xsite EASY display unit. Select machine that will be calibrated in “Installation settings” → “Choose machine”.

To complete the calibration, at least the following tasks should be done in “Installation settings”:

- Frame sensor calibration
- Boom calibrations
- Bucket mount calibration

5.1. Frame sensor calibration

Go to “Installation settings” → “Frame”.

Wizard guides you through the following steps

- Select sensor mounting orientation.
- Enter X offset
- Enter Y offset
- Align the excavator frame with the tracks by slewing the machine. Press “0.0” to calibrate when aligned.
- Slew the excavator 180 degrees and align the frame with the tracks on the opposite direction. Press “0.0” to calibrate when machine is correctly aligned.
- Save correction to sensor by pressing “0.0”.
- Test that pitch and roll of the frame are near zero when the machine is on flat surface.

Exit wizard by pressing the “Bucket” button and accept changes by choosing “Yes” with the “0.0” button.

5.2. Stick sensor calibration

When doing the stick calibration, every step has to be done accurately. Make sure that the steps are done in the correct order.

Go to “Installation settings” → “Boom” → “Stick”.

- Enter stick length (Figure 24). Length is the distance between pins.
- Slew machine roll to near zero. If roll value is too big, text “Turn!” is shown on the screen.
- Align stick horizontally (Figure 25). When at least one of the numbers are on black background, press “0.0” to calibrate. Do not move the boom while the calibration is in progress.
NOTE! When step 3 has been completed, text “Done” will appear on the screen.
- Align stick vertically (Figure 26). When at least one of the numbers is on black background, press “0.0” to calibrate. Do not move the boom while the calibration is in progress.
NOTE! When step 4 has been completed, text “Done” will appear on the screen.
- Set mounting orientation. Xsite EASY recognises the mounting orientation automatically based on steps 3 and 4. If the mounting orientation is wrong, consider doing steps 3 and 4 again or choose correct orientation from the list by using the “0.0” button.
- Move stick to an angle that is between 30...60 degrees (Figure 27). Bucket should be placed on the ground so that the stick is not sinking slowly down. Press “0.0” to calibrate. When calibration position is set, do not move the machine or the boom until you have done steps 7, 8 and 9.
NOTE! When step 6 has been completed, text “Done” will appear on the screen.
- Measure calibration height (Figure 28). Height is easiest to measure by using a point laser. Insert the laser on the same level with the lower pin of the stick and measure vertical distance from the upper pin of the stick to the laser beam.
- Measure calibration distance (Figure 29). Distance can be measured by using a plumb line or a point laser. Insert the plumb line to the upper pin of the stick and measure horizontal distance from the plumb line to the lower pin of the stick. If measurement of the calibration distance is difficult, value can be left to 0.000 m and the calibration wizard calculates the distance automatically.
- Save correction to sensor by pressing “0.0”. If both height and distance have been set in steps 7 and 8, the maximum error can be seen on the screen. If the error is bigger than 0.01 m, steps 6, 7 and 8 should be done again.

- Evaluate the calibration values. Values in the top row are length scaled vectors X, Y and Z. Values in the middle row are pitch, yaw and roll in degrees and the values in the bottom row are G force components from the sensor.

Exit the stick calibration by pressing the “Bucket” button and accept the changes by choosing “Yes” with the “0.0” button.

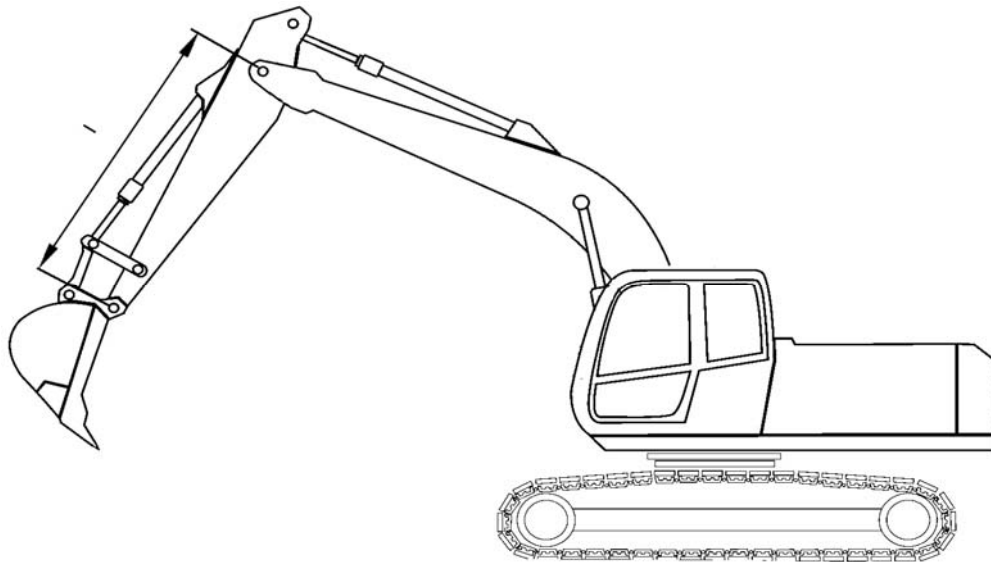


Figure 24. Stick length

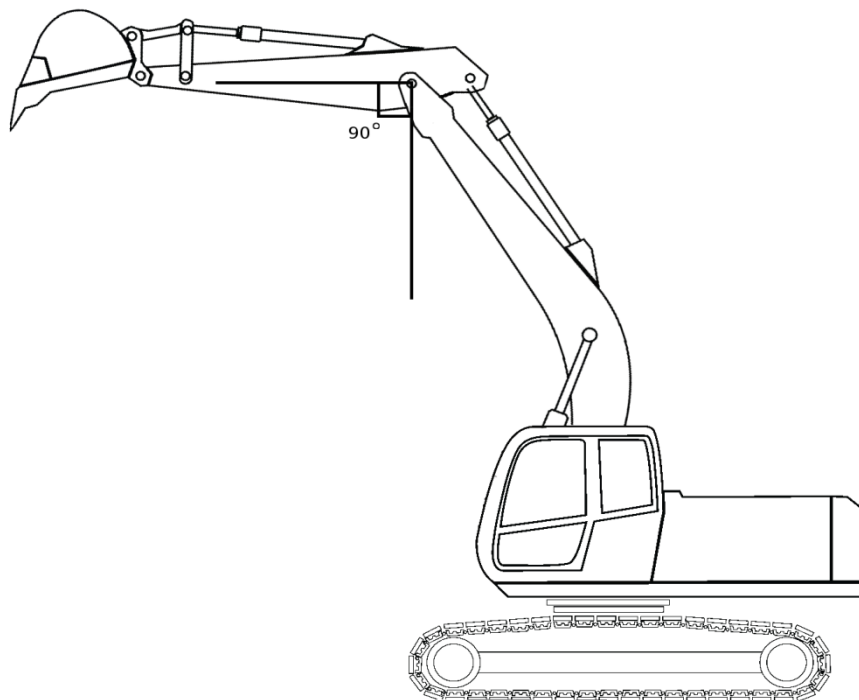


Figure 25. Stick horizontally

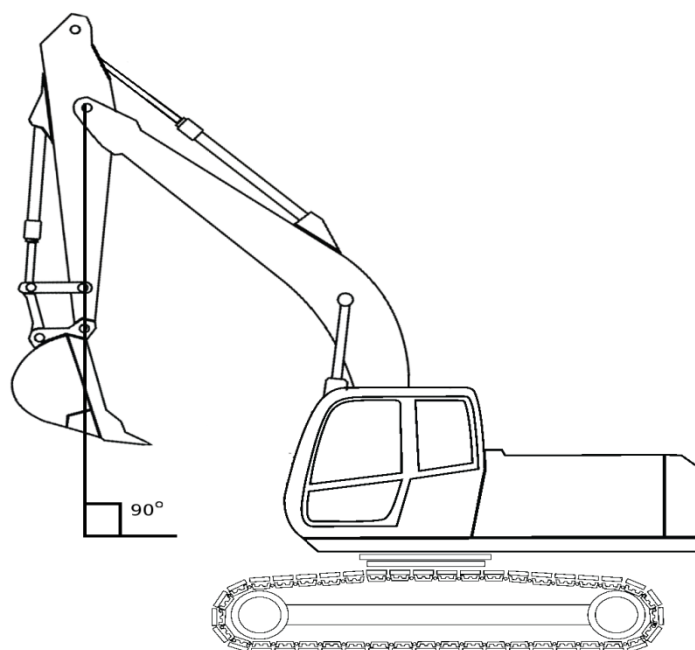


Figure 26. Stick vertically

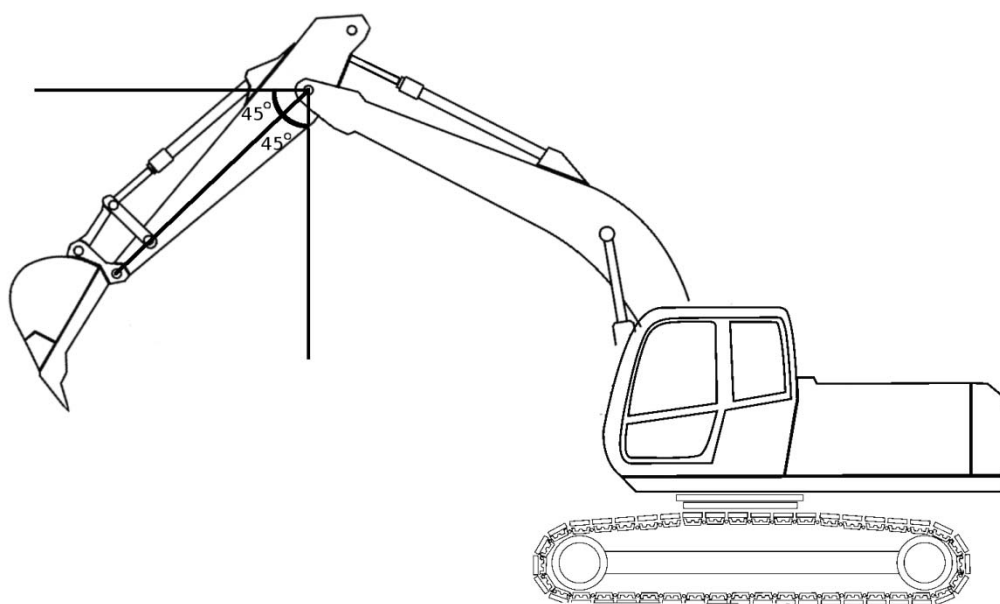


Figure 27. Calibration angle

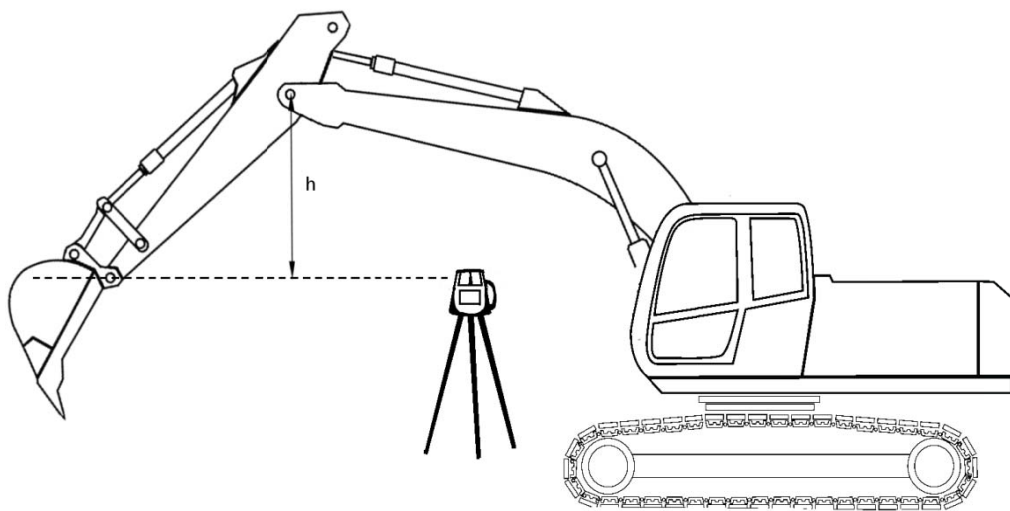


Figure 28. Calibration height

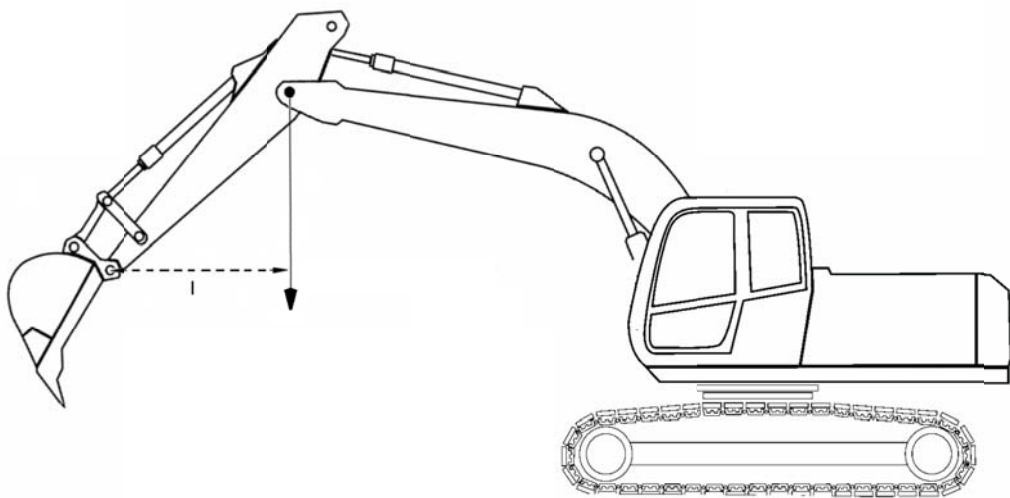


Figure 29. Calibration distance

5.3. Main boom sensor calibration

NOTE! When calibrating a machine that has an extra boom, extra boom sensor has to be calibrated before main boom sensor.

When doing the boom calibration, every step has to be done accurately. Make sure that the steps are done in the correct order.

Go to “Installation settings” → “Boom” → “Main boom”.

1. Enter boom length. Length is the distance between pins.
2. Slew machine roll to near zero. If roll value is too big, text “Turn!” is shown on the screen.
3. Align boom horizontally. Press “0.0” to calibrate. Do not move the boom while the calibration is in progress.

NOTE! When step 3 has been completed, text “Done” will appear on the screen.

4. Align boom vertically. If boom cannot be turned to full 90 degree angle, turn it as up as possible. Press “0.0” to calibrate. Do not move the boom while the calibration is in progress.

NOTE! When step 4 has been completed, text “Done” will appear on the screen.

5. Set mounting orientation. Xsite EASY recognises the mounting orientation automatically based on steps 3 and 4. If the mounting orientation is wrong, consider doing steps 3 and 4 again or choose correct orientation from the list by using the “0.0” button.
6. Move boom to an angle that is close to 45 degrees. If the boom is too high from the ground to do measurements of steps 7 and 8, the angle can be smaller. Regardless, the angle should be at least 20 degrees. Bucket should be placed on the ground so that the boom is not sinking slowly down. Press “0.0” to calibrate. When the calibration position is set, do not move the machine or the boom until you have done steps 7, 8 and 9.

NOTE! When step 6 has been completed, text “Done” will appear on the screen.

7. Measure calibration height. Height is easiest to measure by using a point laser. Insert the laser on the same level with the lower pin of the boom and measure vertical distance from the upper pin of the boom to the laser beam.
8. Measure calibration distance. Distance can be measured by using a plumb line or a point laser. Insert the plumb line to the upper pin of the boom and measure horizontal distance from the plumb line to the lower pin of the boom. If measuring of the calibration distance is difficult, value can be left to 0.000 m and the calibration wizard calculates the distance automatically.
9. Save correction to sensor by pressing “0.0”. If both height and distance have been set in steps 7 and 8, the maximum error can be seen on the screen. If the error is bigger than 0.01 m, steps 6, 7 and 8 should be done again.

10. Evaluate the calibration values. Values in the top row are length scaled vectors X, Y and Z. Values in the middle row are pitch, yaw and roll in degrees and the values in the bottom row are G force components from the sensor.

Exit the boom calibration by pressing the “Bucket” button and accept the changes by choosing “Yes” with the “0.0” button.

5.4. Extra boom sensor calibration

NOTE! When calibrating a machine that has an extra boom, extra boom sensor has to be calibrated before main boom sensor.

Calibration of the extra boom sensor is done in the same way as calibration of the main boom sensor.

5.5. Boom line accuracy test

After calibrating the stick and boom sensors, test the boom line accuracy.

Create a new bucket with lengths of 0 m. Go to “Main menu” → “Buckets” → “<New bucket>” → “Blank values” → “Measures” and make sure that all bucket lengths are 0.000 m. If wanted, the bucket can be given a descriptive name. Exit to the measurement screen and save settings.

Set up a point laser and attach a calibration magnet on the centre point of the lowest pivot pin of the stick.

Move stick and boom so that the laser beam hits the bolt in the calibration magnet (Figure 30). Zero the reading by pressing the “0.0” button. Move stick and boom to different positions and check the accuracy for all positions (at least reach stick and boom as far from the cabin as possible and take them as close to the cabin as possible).

If accuracy is good (tolerance ± 1 cm), proceed to the bucket mount calibration. If accuracy is worse than ± 1 cm, calibrate stick and boom sensors again.

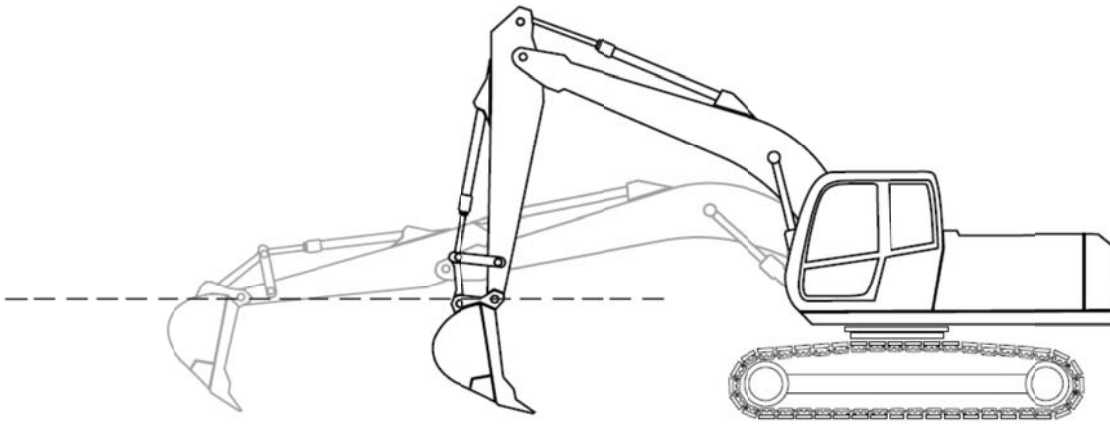


Figure 30. Boom line accuracy check

5.6. Bucket mount calibration

Go to “Installation settings” → “Bucket sensor” → “Mounting place”. Select the correct mounting place from the list and exit by pressing the “Bucket” button.

5.7. Quick coupler

Go to “Installation settings” → “Bucket sensor” → “Calibration”.

1. Slew machine roll to near zero. If roll value is too big, text “Turn!” is shown on the screen.
2. Turn the bucket down. Press the “0.0” button to calibrate.
NOTE! When step 2 has been completed, text “Done” will appear on the screen.
3. Turn the bucket up/forward. Press the “0.0” button to calibrate.
NOTE! When step 3 has been completed, text “Done” will appear on the screen.
4. Set mounting orientation. Xsite EASY recognises the mounting orientation automatically based on steps 2 and 3. If the mounting orientation is wrong, consider doing steps 2 and 3 again or choose correct orientation from the list by using “0.0” button.
5. Save correction to sensor by pressing the “0.0” button.
6. Calibrated sensor roll can be tested by turning the bucket to different positions and checking that the roll value is near zero.

Exit the quick coupler calibration by pressing the “Bucket” button and accept the changes by choosing “Yes” with the “0.0” button.

5.8. Linkage

Go to “Installation settings” → “Bucket sensor” → “Linkage measures”.

Set values P9–P13 (see chapter 3.2). Exit by pressing the “Bucket” button and accept the changes by choosing “Yes” with the “0.0” button.

Go to “Installation settings” → “Bucket sensor” → “Calibration”.

1. Slew machine roll to near zero. If roll value is too big, text “Turn!” is shown on the screen.
2. Align linkage part P13 horizontally by using a point laser or spirit level.
NOTE! When step 2 has been completed, text “Done” will appear on the screen.
3. Turn linkage part P13 up. Press the “0.0” button to calibrate.
NOTE! When step 3 has been completed, text “Done” will appear on the screen.
4. Set mounting orientation. Xsite EASY recognises the mounting orientation automatically based on steps 2 and 3. If the mounting orientation is wrong, consider doing steps 2 and 3 again or choose correct orientation from the list by using “0.0” button.
5. Save correction to sensor by pressing the “0.0” button.
6. Calibrated sensor roll can be tested by turning the bucket to different positions and checking that the roll value is near zero.

Exit the linkage calibration by pressing the “Bucket” button and accept the changes by choosing “Yes” with the “0.0” button.

5.9. Completing the calibration

After a successful machine calibration and boomline accuracy test, buckets should be calibrated.

Please see the Xsite EASY user manual for instructions on how to calibrate buckets and tilting buckets. User manual also provides instructions on how to check the accuracy after bucket calibration and tilt bucket calibration.

6. Declarations of Conformity

EC Declaration of Conformity

Document no: EDI3-EC-002

We, the undersigned,

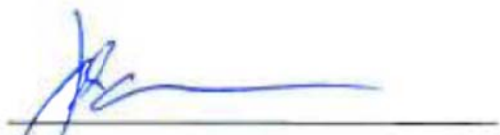
Manufacturer: Novatron Oy
Address: Myllyhaantie 6 E, 33960 Pirkkala, Finland
Phone number: +358-3-357 2600
Fax number: +358-3-357 2677

certify and declare under our sole responsibility that the following equipment,

Name: Easy Dig / Xsite EASY
Components: 100012 Easy Dig v3 display / 100022 Xsite EASY v3 display
130192 G1 sensor
100008 EL2 laser receiver
100065 XD2 LED display
140102 XD2 connection box

is in conformity with the requirements of EMC directive 2004/108/EC. The following standards have been applied: EN 13309:2010, ISO 7637-2:2004.

Place of issue: Pirkkala, Finland
Date of issue: 12 March 2013



Jukka Tervahauta
Managing Director
Novatron Oy

FCC Declaration of Conformity

Document no: EDV3-FCC-002

We, the undersigned,

Manufacturer: Novatron Oy
Address: Myllyhaantie 6 E, 33960 Pirkkala, Finland
Phone number: +358-3-357 2600
Fax number: +358-3-357 2677

certify and declare under our sole responsibility that the following equipment,

Trade names: Easy Dig / Xsite EASY
Model numbers: 100012 Easy Dig v3 display / 100022 Xsite EASY v3 display
130192 G1 sensor
100008 EL2 laser receiver
100065 XD2 LED display
140102 XD2 connection box

complies with part 15 of the FCC rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Place of issue: Pirkkala, Finland
Date of issue: 12 March 2013



Jukka Tervahauta
Managing Director
Novatron Oy

Notes:

Notes:

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Kapellenstr. 15
65555 Limburg
Internet: www.moba.de



03/2013